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INVESTIGATION OF THE HYDRODYNAMICS OF MIXING TWO TECHNOLOGICAL MEDIA USING A SIX-BLADE AGITATOR

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Abstract. The precipitation of ammonium polyuranate is carried out in a cascade of reactors equipped with a agitator and a heat exchanger. In the course of this study, the existing mixing device was replaced by a six-blade 3D model of which is shown in Figure 1. Data were obtained on the distribution of two technological media and flow rates in the volume of the apparatus at different operating modes of the mixing device.

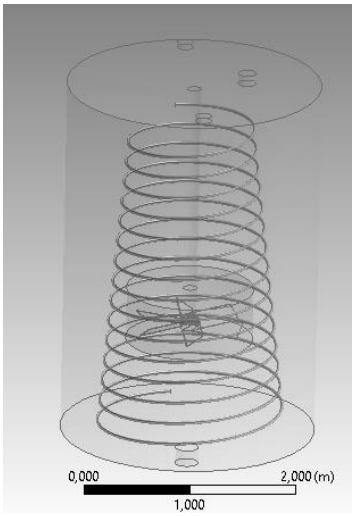

Figure 1. Model of the device with a six-blade mixing device

For numerical calculations of hydrodynamics in the apparatus, the Manninen[1] multiphase model and the standard k-epsilon turbulence model[2] were used under the condition of the reactor operating in a periodic mode.

Data on the minimum residence time of the media in the apparatus, excluding the time required for the chemical reaction, are presented in Table 1.

Table 1. Minimum residence time of media in the apparatus under various modes

Mixing device rotation frequency, rpm	Minimum residence time, min
180	45
240	35
420	40
600	30
720	20
1020	20

References
1. Manninen M. On the Mixture Model for Multiphase Flow / M. Manninen, V. Taivassalo. – Espoo : Technical Research Center of Finland, VTT Publications,1996. – 67 p.
2. Avramenko M. I. O k–ε modeli turbulentnosti (Preprint Snezhinsk: Izdatelstvo RFYC– VNIITF, 2005, No. 224), pp. 1–21.

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